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ABSTRACT

Verbal Self-instruction was employed in training impulsive first-grade children to perform visual discrimination matching tasks. The effects of self-verbalization (as opposed to tutor verbalization) and strategy training employment of four training conditions: verbal self-instruction and strategy training; strategy training; verbal self-instruction; and materials control. Matching tests, given immediately following each of the four individual training sessions that each of the twelve subjects per condition received, were scored for response latency and errors. Results showed that while strategy training increased latency, self-verbalization both increased latency and reduced errors. (Author)

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ABSTRACT

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Verbal self-instruction was employed in training impulsive first grade children to perform visual discrimination matching tasks. The effects of self-verbalization (as opposed to tutor verbalization) and strategy training were compared through the employment of four training conditions: I. Verbal self-instruction and strategy training; II. Strategy training; III. Verbal self-instruction; and IV. Materials control. Matching tests, given immediately following each of the four individual training sessions that each of the twelve subjects per condition received, were scored for response latency and errors. Results showed that while strategy training increased latency, self-verbalization both increased latency and reduced errors.

Self-verbalization Versus Strategy Training: the Immediate Effects of Verbal Self-Instruction Training on Impulsive First Grade Children

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An impulsive conceptual tempo, as developed by Kagan (c.f. Kagan, 1966; Kagan & Kogan, 1970), has been shown to be associated with performance in reading recognition (Kagan, 1965b), inductive reasoning (Kagan, 1965a), task persistence (Kagan, Rosman, Day, Albert, & Phillips, 1964), and learning disabilities (Keogh & Donlon, 1972). With evidence that impulsivity may affect school performance, several investigators have focused on techniques to modify impulsive responding. Impulsivity has usually been assessed by the Matching Familiar Figures (MFF) test, a match to sample visual discrimination task with six alternatives, one of which matches the standard. An impulsive child is one which exhibits a very fast latency and high errors. Three main approaches to modifying impulsive responding have been attempted with varying degrees of success.

Several investigators have focused on inducing the subject to delay his response through enforced delay (Kagan, Pearson, & Welch, 1966b), reinforcement of increased latency (Briggs, 1966; Weinberg, 1968), and modeling reflective behavior (Debus, 1970; Denney, 1972; Yando & Kagan, 1968) with results usually showing that latency on the MFF is increased, but no significant reduction in errors in achieved.

A second approach that has been used to modify impulsivity is training specific attention deployment strategies to enhance task performance. Several studies (Egeland, 1974; Nelson, 1968; Ridberg, Parke, & Hetherington, 1971) have shown both decreased errors and increased latency on the MFF post-post. There is evidence that even if subjects are not explicitly trained step by step in attention deployment strategies, if they actively perform the tasks in which the strategies are implicit, they will reduce errors on an MFF post-test (Duckworth, Ragland, Sommerfield, & Wyne, 1974; Egeland, 1974; Zelnicker, Jeffrey, Ault, & Parsons, 1972).

A third orientation employs verbal self-instruction (VSI) training (Meichenbaum & Goodman, 1971; Wozniak & Neuchterlein, 1973) which is based on the self-regulatory function of speech proposed by Luria (1969) and others (Kohlberg, Yaeger, & Hjertholm, 1968; Wozniak, 1972). Meichenbaum and Goodman (1971) contrasted an attention deployment strategy-trained condition without self-verbalization, a VSI strategy trained condition, and an attentional control in which subjects only performed the tasks; results showed that VSI strategy trained subjects reduced errors and increased response time on the MFF, while the strategy trained group only increased latency and the attentional control showed no significant post-test change. Wozniak and Neuchterlein (1973) compared VSI attention deployment strategy trained subjects with an attentional control that performed the training tasks and an in class control condition. They found that only VSI trained subjects significantly reduced errors on the MFF post-test. Thus,

verbal self-instruction training, which involved verbalizing the strategies to oneself, was shown to be effective in reducing errors.

The present study was designed to ascertain the separate effects of VSI training and strategy training on impulsive responding. It is unclear from the above studies if in the regulation of impulsive responding a) self-verbalized strategies are more effective than tutor-verbalized strategies (Meichenbaum and Goodman did not equate the amount of verbalization of the strategies), and b) self-verbalization of strategies is more effective than self-verbalization of general instructions to go slowly and find the match without specific strategies verbalized. The design compared four treatment conditions: I. Verbal self-instruction strategy training (VSI-ST), II. Tutor verbalized strategy training (ST), III. Verbal self-instruction without any explicit strategy training (VSI), and IV. an Attentional materials control (AMC) condition that looked at the materials, was not instructed to do the task, and received minimal tutor instruction. See Figure 1.

Insert Figure 1 about here

It was hypothesized that for both error reduction and response time increments on the immediate post-test: 1) self-verbalization would be more effective than tutor-verbalization; 2) strategy training would be more effective than having no explicit strategy training; and 3) VSI strategy training would be the most effective treatment for modifying impulsivity.

Method

Subjects

The first grade population (371) of a suburban school district in southern California was administered the MFF. Subjects scoring above the median of 16 errors and below the median of 9.5 seconds were designated as impulsive. From the 122 impulsive subjects a randomly chosen subsample of 28 males and 28 females were randomly allocated to the four treatment conditions, with seven males and seven females in each condition. Subject attrition due to moving and absenteeism reduced some conditions to 12; for convenience in analysis subjects were randomly removed so that each condition had an n of 12 with a distribution of not more than seven or less than five of each sex.

Materials

The materials used in the four training lessons varied from raised letters which stimulated kinesthetic discrimination to outline drawings which required visual discrimination. In lesson A letter rubber stamps from a child's printing set were used. Lesson B employed animal rummy cards, some of which were slightly altered by the experimenter. The materials in lesson C were humorous outline drawings of monkey heads. The seven dwarfs from a paper doll book were xeroxed and employed in lesson D. The number of alternatives, (i.e., the number of items from which the child chose a match), given for the matching tasks used in training increased from two to three in lesson A and B, two to five in lesson C, and four to six in lesson D. From one to three features on a

set of materials for a trial differed; the number of features varied increased as the lessons progressed. There were seven trials for lesson A, eight trials for lesson B, and six trials for lessons C and D.

Each of the four immediate post-tests consisted of six items and was similar in format to the MFF, i.e., a standard and six alternatives, only one of which matched the standard, were displayed. Order of positions were randomly assigned. The stimuli were similar to that used in the training sessions, but all items were different from the examples used in training. The post-test for lesson A consisted of letters from the printing set printed on paper. Xerox copies of different animal rummy cards were employed in the immediate post-test for lesson B. Different features were varied on the monkey pictures in the lesson C post-test. For lesson D, Snow White, the witch, the prince, and some dwarfs were used in the post-test. Feature variations used both in training and on the immediate post-tests were similar in nature to variations found on the MFF.

Procedure

Each subject in the four training groups was individually tutored on four consecutive days in sessions ranging from 10-25 minutes depending on the treatment condition and the pace of the subject. Each subject had the same number of trials on the same materials. Tutors were four females; each tutored all the impulsive subjects that had been randomly allocated to treatment conditions in her assigned school. Immediately following each training session, subjects were tested by the tutor on the appropriate post-test.

Strategy training

In the two strategy training conditions (I and II) the elements verbalized by the subject were: 1) general directions about what response the task required and to go slowly and carefully, 2) specific directions about how to do the task, uttered before the subject acts and incorporating the specific strategies employed, and 3) self-reinforcement.

The attention deployment strategies trained in this study are similar to those found by Siegelman (1969) to be characteristic of reflective responders and employed in training studies by Nelson (1968) and Egeland (1974).

The strategies were sequentially developed in the four lessons. Lesson A focused on comparing two letters at a time to find the parts that were different in order to find a match the same as the standard. Tracing was used in both the strategy training conditions. Differences, rather than similarities, were stressed because of evidence that young children scan a limited area of the stimulus, and if no objective differences are found make a judgment of similarity (Vurpillot, 1968). A strategy that focused on similarities between pictures would not train skills the young child needs to do a visual discrimination task well.

The strategy training in lesson B stressed sequential comparison of parts on two cards to find differences, comparison with the standard to see if those different parts were the same or different from the standard, and discarding to one side those cards different from the

standard until the match was found. The subject pointed to equivalent parts on the two cards. In lesson C, in addition to the strategies already learned and continued from lesson B, the subjects were also trained to compare parts from the top down on two pictures, compare two adjacent alternatives for different parts, and cover discarded alternatives until the match was found. The subject pointed to equivalent parts on two pictures. In the last lesson, the strategies taught previously were reinforced. The subject did not cover discarded alternatives with cards, but instead remembered which ones were "out."

VSI-ST condition

In the VSI strategy training treatment the subjects first observed the tutor verbally self-instruct herself. For example: "Watch how I do this so you will know how to do the rest. OK, I am going to find the one to match the one up there (indicate standard). I am going to go slowly and carefully so I won't make a mistake. First, I'll look at these two and see if they have different parts. . . ." The tutor reinforced herself during the training and when the correct match was found by saying: "Very good, E's name ." Then the child did the same task or a similar one. The subjects were faded from overt to whispered and then to covert self-instruction as soon as the tutor thought he was using the strategy effectively. The child was prompted by the tutor if he did not self-instruct easily.

ST Condition: In the procedure for condition II, the tutor verbalized strategy training treatment taught the same strategies and the same words were verbalized. But the verbalization and reinforcements were uttered by the tutor; the child only pointed or answered "yes" or "no" to questions posed by the tutor.

VSI condition: These subjects were trained to self-instruct about the general task, but not any specific strategies. For example: "I am going to find the one that matches the one up there. I am going to go slowly and carefully so I won't make a mistake." The tutor did not model any scanning with the eyes or verbalize any other strategies. After a pause the tutor would indicate the correct alternative and reinforce herself. As in the VSI-ST condition, verbalization was faded from overt to covert.

AMC condition: The control group subjects were told to look at the materials; they were not asked to match or say anything. They were reinforced with "Good" after they had glanced at the materials.

Immediate post-test: In administering the post-test, the subject was told: "Now I have a game you can play. I want you to find the one down here that is just like the one up here." Response latency for the first choice and the sequence of choices were recorded. If the child did not answer correctly the first time, he was told: "No, that is not right. Find the one just like this one." The standard was indicated. As on the MFF, a total of six responses is possible for each of the items. The four immediate post-tests were assumed to increase in difficulty due to the nature of the stimuli employed.

Analyses: A three factor analysis of variance with repeated measures was used (Winer, 1971). Tukey's test was used for post hoc comparisons between means (Glass & Stanley, 1970).

Results

The analysis of variance showed significant main effects for self-verbalization in both mean latency ($F = 4.15$; $df = 1,44$; $p < .05$) and total errors ($F = 4.68$; $df = 1,44$; $p < .05$). The strategy training factor was significant for mean latency ($F = 5.61$; $df = 1,44$; $p < .05$), but total errors were not significantly reduced ($F = 1.51$; $df = 1,44$; $p > .05$).

Thus, the first hypothesis that self-verbalization would be more effective than tutor verbalization is upheld for both error reduction and response time increment. The second hypothesis that strategy training would be more effective than having no explicit strategy training was substantiated only for latency, with errors showing no significant reduction. These results also indicate that for the immediate post-tests the self-verbalization factor was more effective in modifying both aspects of impulsivity, i.e., errors and latency, than was the strategy training factor which only affected response time.

The significant main effect for days (latency: $F = 21.3$, $df = 3,44$; $p < .001$; errors: $F = 89.2$; $df = 3,44$; $p < .001$) verifies the expectation that the immediate post-tests became more difficult on succeeding days, and thus the subjects made more errors and had a longer latency.

Post hoc Tukey's tests comparing means for response time show that the VSI Strategy Training treatment condition was significantly more effective in increasing the latency than the other conditions (I vs. II: $t = 2.3$; $df = 4,44$; $p < .05$; I vs. III: $t = 2.63$; $df = 4,44$; $p < .05$; I vs. IV; $t = 2.12$; $df = 4,44$; $p < .05$). The means for response time are shown on Table 1.

Insert Table 1 about here

The difference between conditions II and III for latency was not significant ($t = .33$, $df = 4,44$; $p > .05$), nor was the difference between condition III and the control group ($t = 1.79$; $df = 4,44$; $p > .05$). The tutor verbalized strategy trained (condition II) subjects had a significantly longer latency than the control subjects ($t = 2.12$; $df = 4,44$; $p < .05$).

Insert Table 2 about here

As can be seen in Table 2, the same trend is found for errors with VSI-ST subjects making the fewest errors (5.9), conditions II and III making about the same number of errors (6.7 and 6.2, respectively), and the control group making the most errors (7.8). None of these comparisons for errors are significant, however.

Thus, the hypothesis that VSI strategy trained subjects would perform best on the immediate post-test is upheld for latency, but for errors only a non-significant trend is observed. Subjects in the tutor

verbalized strategy training condition and the VSI condition perform equivalently in both error reduction and latency increment, thus lending support to the prediction that neither component alone is as effective as they are when used in conjunction with one another.

Discussion

It was found on an immediate post-test that when the child verbalizes the strategy to himself and guides himself with his speech, he both reduces errors and increases the response time on a match to sample task relative to a tutor verbalized instructional treatment. This finding suggests that a learning situation in which the impulsive child observes a model self-instruct and then employs VSI himself on a similar task is more effective than a tutor verbalized and directed condition. Employing VSI, the child can respond in a more reflective manner and perform the task with fewer errors. These findings are congruent with the Soviet position (Luria, 1969) about the self-guiding function of speech. Thus, the self-regulating speech the child uses to direct himself through the task has a greater effect on the modification of impulsivity than if the tutor directs the child.

The results also showed that the strategy training component of VSI increased latency, but showed no significant decrease in errors. Post hoc tests comparing means reveal the VSI strategy trained subjects to have a significantly longer latency than subjects in the other conditions. This trend is also present for reduction of errors, but the differences are not significant. When each component is employed

alone, as in the strategy training treatment (condition II) and the VSI condition (condition III), there was not a significant difference for latency or errors. It can be concluded, therefore, for this immediate post-test, that self-verbalization in conjunction with strategy training was most effective in modifying impulsivity.

These findings on an immediate post-test reflect a pattern that has been found in other studies. Meichenbaum and Goodman (1971) conducted a 20 minute training session and post-tested on the MFF immediately after training. They found that subjects that did not receive VSI training in conjunction with strategy training increased latency on the MFF, but did not significantly reduce errors. On the other hand, VSI trained subjects increased latency and reduced errors significantly. Wozniak and Nuechterlein (1973) had a six month, twice a week, training period and post-tested a few days after training ended. They found that VSI trained subjects, as contrasted to subjects that performed the tasks without self-verbalization, significantly reduced errors on the MFF. The present study, of four short training periods with immediate post-tests similar to the MFF, suggests that self-verbalized strategies are more effective than tutor-verbalized instruction. The results also lend support to the conclusion that self-verbalization of strategies is more effective than self-verbalization of only general instructions. The delayed post-test results given to the subjects in this study, as reported in Bender (1975), reveal few significant differences between treatment conditions. The available evidence, then, indicates that verbal self instruction in conjunction

with strategy training best facilitates error reduction and latency increment on a match to sample task on an immediate post-test after a short period of training. A longer period of training seems necessary to obtain these results on a post-test given a few days later.

Thus, the evidence from these three studies suggests that self-verbalization can enhance the learning of task specific strategies. The educational implications of this conclusion are that an impulsive child could be taught how to use self-guiding speech, learn task specific strategies better, and thus perform the task more correctly and reflectively.

The reflection-impulsivity dimension is a two pronged concept. The focus should be not just on increasing the latency to obtain a more reflective response. It is also necessary to teach the child strategies in order to reduce errors. In considering instructional techniques to modify impulsivity, those that both reduce errors and increase response time should be used. Verbal self-instruction, taught in conjunction with task specific strategies, offers promise of filling this function.

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Footnotes

[1] Copies of the paper may be obtained by writing to the author at the Department of Education, University of California, Riverside, Riverside, California 92502. The author wishes to thank the school personnel and children of Moreno Valley School District for their cooperation, Dr. Arthur Silverstein for his advisement on the statistical analyses, and Dr. James E. Turnure for his help with the design. This study was financed in part by U. S. Office of Education Training Grant # OEG-0-72-3975 (603).

Figure 1: Design for Comparing the Self-Verbalization and Strategy Training Components of Verbal Self-Instruction

	Verbal Self-Instruction (VSI)	Tutor-Verbalized Instruction
Explicit Strategy Training	I. VSI-ST S was taught strategies S used self-directing speech	II. ST S was taught strategies S did not use self-directing speech
No Explicit Strategy Training	III. VSI S was not taught strategies S used self-directing speech	IV. AMC S was not taught strategies S did not use self-directing speech

Table 1: Mean Response Latency in Seconds on the Immediate Post-tests for Four Treatment Conditions

	I. Verbal Self-Instruction and Strategy Training	II. Tutor-Verbalized Strategy Training	III. Verbal Self-Instruction	IV. Attentional Materials Control
Day 1	3.9 sec.	3.6 sec.	3.6 sec.	3.7 sec.
Day 2	11.0	7.3	8.0	5.9
Day 3	13.4	8.9	8.5	6.4
Day 4	11.6	10.9	9.3	6.1
Mean	10.0 sec.	7.7 sec.	7.4 sec.	5.6 sec.

Table 2: Total Errors on the Immediate Post-tests for Four Treatment Conditions

	I. Verbal Self-Instruction and Strategy Training	II. Tutor-Verbalized Strategy Training	III. Verbal Self-Instruction	IV. Attentional Materials Control
Day 1	1.3	2.3	1.0	1.5
Day 2	5.3	5.3	5.6	7.5
Day 3	9.0	9.6	10.4	11.3
Day 4	8.1	9.4	7.8	10.7
Mean	5.9	6.7	6.2	7.8